Presentation for Macquarie Securities

Trends in mobile infrastructure sharing

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Contents

- Introduction to Analysys Mason
- Global trends in network sharing
- Case studies
- Summary
General overview of Analysys Mason

- Analysys Mason is the world’s premier adviser in telecoms, IT and media
- We provide strategy advice, operations support and market intelligence to leading players, and our work has had a major influence on the industry for more than twenty years. We have:
  - led the liberalisation of telecoms around the world
  - established many of the core principles and policies used by regulators to govern the operation of the sector
  - mediated in major issues of policy for both commercial parties and regulators
  - supported several hundred transactions and licence acquisition processes for operators and financial institutions
  - delivered planning, programme management and operational support to numerous new networks, network upgrades and network consolidation exercises
  - provided operational support to major operators in the roll-out and expansion of businesses across the sector
  - delivered significant service improvements to clients procuring new networks and services
- We excel at solving the toughest problems facing our clients in all areas of their business
- The benefits we deliver are based on our core differentiators of intellectual rigour, independence, and operational experience
Our global presence serves a client base covering more than 80 countries worldwide.

We are trusted around the world for our expertise, impartiality and ability to get the best results for our clients.
Contents

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- Global trends in network sharing
- Case studies and track record
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Mobile infrastructure sharing can take many forms

- **Passive sharing**
  - Site locations (for which rental is due)
  - Masts
  - Cabinets or buildings
  - Power, lighting and air conditioning

- **RAN sharing**
  - Antennae
  - Base station equipment (2G or 3G)
  - Transmission
  - Base station operations and maintenance
  - Radio design and planning

- **Deeper sharing or integration**
  - Radio spectrum
  - Core network
  - IMS
  - Content platforms
  - Billing
  - Customer services

Increasing levels of sharing
Regulation is increasingly supportive of infrastructure sharing

- Infrastructure sharing brings a range of potential benefits that help foster regulatory support
  - potential benefits to consumers include the more widespread availability of basic telephony and/or broadband services, faster network roll-out, increased choice of suppliers and lower cost of services
  - infrastructure sharing may stimulate competition, for example by shifting the focus of operators’ differentiation from coverage towards services or by enabling new entrants to launch their services more rapidly
  - environmental benefits arise from a decrease in the overall number of cell-sites, which reduces the visual impact of mobile networks, plus lower energy consumption if power supplies are shared
  - pooling spectrum for RAN or backhaul operation is sometimes allowed, to optimise the use of national spectral resources. However, operators are often required to use their assigned frequencies as a condition of RAN sharing
- Passive infrastructure sharing is permitted in very many countries worldwide
- Active infrastructure is less commonly supported, but is becoming more widely considered, especially because of its potential benefits for rural broadband
Passive sharing is common, and TowerCos have emerged as specialist providers of site-sharing facilities

<table>
<thead>
<tr>
<th>Region</th>
<th>Passive sharing activity</th>
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<tbody>
<tr>
<td>North America</td>
<td>Strong TowerCo presence, with major players including American Tower, Crown Castle, Global Tower Partners and SBA Communications. Some larger TowerCos have international portfolios and are targeting key growth markets, such as Brazil and India</td>
</tr>
<tr>
<td>Europe</td>
<td>Passive infrastructure sharing common, and encouraged by the EU Framework Agreement. TowerCo model not as prevalent as in USA but major players include Abertis Telecom, Arqiva, DMT and TDF. Several key site-sharing agreements between operators, notably ten-year multi-market co-operation between Telefónica O2 and Vodafone covering Germany, Ireland, Spain and UK</td>
</tr>
<tr>
<td>Middle East</td>
<td>Site sharing becoming more common, with agreements signed in recent years by operators in Kuwait, Qatar and the UAE</td>
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<tr>
<td>Africa</td>
<td>Passive site sharing supported in a number of countries, and is sometimes mandated (e.g. in Nigeria). Several announcements on site sharing in recent years, including Essar Telecom/Zain in Kenya, Meditel/Wana in Morocco and Cell C/MTN/Neotel/Vodacom in South Africa. A few independent towercos are emerging, such as Helios in Nigeria</td>
</tr>
<tr>
<td>Asia-Pacific</td>
<td>Operator TowerCo spin-offs/independents in some markets, including Australia and India. India strongly promotes infrastructure sharing, and TowerCos have proliferated, though consolidation is now underway. Indus Towers (the site-sharing venture of Bharti Airtel, Vodafone Essar and Idea) is the largest towerco in the world, with 100 000 sites. Many countries in Asia are following India’s lead in considering the benefits of mobile infrastructure sharing, including Bangladesh, Bhutan, Nepal and Pakistan. China requires its three mobile operators to share cell-site facilities. Existing sites must be made available for sharing and new sites jointly constructed. Backhaul networks may also be shared</td>
</tr>
<tr>
<td>Latin America</td>
<td>Independent TowerCos are active in several countries, including Brazil and Mexico, and passive infrastructure sharing is also permitted elsewhere. Ecuador introduced mandatory site sharing in December 2009</td>
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RAN sharing promised significant cost savings for early 3G networks but few deals came to fruition

<table>
<thead>
<tr>
<th><strong>Country</strong></th>
<th><strong>Date</strong></th>
<th><strong>Details</strong></th>
<th><strong>Status</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>2005</td>
<td>JV between H3G and Telstra to jointly own and develop a 3G network</td>
<td>Operational. Telstra later built an independent national HSPA+ network</td>
</tr>
<tr>
<td>Australia</td>
<td>November 2004</td>
<td>Ten-year agreement between Optus and Vodafone to share an urban 3G network</td>
<td>Operational. Both operators have own HSPA networks outside urban areas</td>
</tr>
<tr>
<td>Germany</td>
<td>June 2001</td>
<td>3G site sharing and national roaming agreement between O2 and T-Mobile. EC initially ruled that national roaming restricted competition and imposed restrictions, but this was overturned by the Court of First Instance</td>
<td>Implemented, until agreement terminated at end of 2009, when O2 considered its own 3G network provided adequate coverage</td>
</tr>
<tr>
<td>Germany</td>
<td>September 2001</td>
<td>3G network-sharing agreement between KPN and a consortium of Telefónica/Sonera (Group 3G UMTS)</td>
<td>Not implemented, as Group 3G UMTS handed back its licence</td>
</tr>
<tr>
<td>Netherlands</td>
<td>November 2001</td>
<td>KPN Mobile and Telfort agreed to co-operate on 3G network construction</td>
<td>JV abandoned in 2003, and KPN acquired Telfort two years later</td>
</tr>
<tr>
<td>Netherlands</td>
<td>2002</td>
<td>Ben Nederland (later T-Mobile) and Dutchtone (later Orange) formed a JV, RANN, to build a joint 3G network, including shared RAN and O&amp;M centre. In practice, the agreement was limited to passive site sharing</td>
<td>Agreement terminated in 2004, with operators claiming they could build their 3G networks more quickly on their own. T-Mobile acquired Orange in 2007</td>
</tr>
<tr>
<td>Sweden</td>
<td>March 2001</td>
<td>Tele2 and Telia announced a JV, Svenska UMTS-nät, to own and build a joint 3G network</td>
<td>Operational</td>
</tr>
<tr>
<td>Sweden</td>
<td>May 2001</td>
<td>Hi3G Access and Europolitan announced a JV, 3GIS, to deploy 3G outside major cities</td>
<td>Operational</td>
</tr>
<tr>
<td>UK</td>
<td>June 2001</td>
<td>BT Cellnet and One2One agreed to roam onto each others’ networks in small cities and rural areas</td>
<td>Not implemented, with operators instead building their own networks</td>
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</tbody>
</table>
Most mature operators have instead built their own 3G networks

- Despite the potential for capex and opex savings, the surge in interest in network sharing in the years around 2001 declined
- A lack of support in 3GPP standards for equipment and devices, immature regulation, and the significant challenges of agreeing network-sharing terms limited 3G RAN sharing in practice
- Almost all operators opted instead to build and operate their own dedicated 3G networks
- Most 3G roll-outs have been slow. 3G coverage continues to be inferior to 2G coverage, which has contributed to disappointing take-up of 3G services
- Pioneering network-sharing agreements led to support for RAN sharing being incorporated within the 3GPP standards for HSPA and LTE
Recent years have seen a renewed interest in the deeper forms of network co-operation

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<tr>
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</thead>
<tbody>
<tr>
<td>Canada</td>
<td>October 2008</td>
<td>Bell Mobility and Telus announced a RAN-sharing agreement to build a joint national HSPA+ network</td>
<td>Operational. Services launched in November 2009</td>
</tr>
<tr>
<td>Germany, Ireland, Spain, UK</td>
<td>March 2009</td>
<td>Ten-year agreement between Telefónica O2 and Vodafone for deep site sharing, including site consolidation (UK) and joint new site build (Ireland, UK)</td>
<td>Active. 100 sites in UK operational or under construction in 4Q 2009</td>
</tr>
<tr>
<td>Jamaica</td>
<td>July 2009</td>
<td>Claro and LIME announced co-operation on site development, with each party committed to providing an equal number of sites</td>
<td>Active</td>
</tr>
<tr>
<td>Spain</td>
<td>November 2006</td>
<td>RAN-sharing agreement France Telecom and Vodafone for towns with populations below 25 000</td>
<td>Operational</td>
</tr>
<tr>
<td>Sweden</td>
<td>April 2009</td>
<td>Tele2 and Telenor formed a JV, Net4Mobility, to build shared national LTE and GSM networks</td>
<td>In deployment</td>
</tr>
<tr>
<td>UK</td>
<td>February 2007</td>
<td>Vodafone and Orange announced a 3G RAN-sharing venture, but in practice co-operation has been limited to enhanced site share and joint site development</td>
<td>Active</td>
</tr>
<tr>
<td>UK</td>
<td>December 2007</td>
<td>T-Mobile and H3G founded a 50:50 JV company, MBNL, to consolidate their 3G networks, with estimated cost savings of around GBP2 billion</td>
<td>Operational. Approximately shared 4000 masts by November 2009</td>
</tr>
<tr>
<td>Vietnam</td>
<td>April 2009</td>
<td>EVN Telecom and Hanoi Telecom won a joint 3G licence and will construct a shared network</td>
<td>In deployment</td>
</tr>
</tbody>
</table>
Cost pressures are driving many mature operators to enter network-sharing talks with competitors

Major challenges for exist mobile network operators:

- The economic environment presents an uncertain future. Access to cash for investment is currently almost impossible
- Penetration in many markets has hit saturation point, with ARPUs static or declining
- The increased cost of power is driving up site opex
- The cost of site rental is also increasing. Many leases agreed when the networks were first built are now coming up for renewal. Landlords are expecting higher rents
- The rural business model is often marginal. Joint site initiatives improve the business model for mobile network operators (although 2G spectrum refarming may be a viable alternative)
- The success of mobile broadband is placing greater demand on 3G networks, and operators will need to invest in better coverage, higher data rates, and more capacity. The next generation of mobile broadband, LTE, will require major investment by operators in new spectrum, as well as in new network build
- Mature operators are competing on differentiated, targeted services. These require development and investment, increasing costs

By the end of 2010 we expect the majority of MNOs to have considered network sharing of some sort
RAN sharing can transform the economics of operating mobile networks

Operating a network is a major cost for operators …

- Operators currently face the cost of maintaining 2G networks and rolling out 3G networks
- In most markets there are multiple operators with overlapping coverage
- Operators are developing their LTE roll-out strategies for launches from 2012

… RAN sharing could lead to large savings …

- By sharing all or part of their RANs, two (or more) operators can reduce costs:
  - rationalise their site portfolios, reducing rental and maintenance costs
  - consolidate their transmission networks
  - share future the costs of 3G roll-out or new LTE network build

… and could enable operators to improve existing services

- Operators could choose to invest the savings from RAN sharing to improve the customer experience by:
  - accelerating new roll-out
  - extending coverage to previously unviable areas
  - being ‘greener’

An illustration of the potential savings from sharing for a European operator

Source: Analysys Mason
LTE improves network economics but operators may need to share this new network investment

- Catering for the enormous growth in mobile broadband traffic is one of the biggest challenges for operators today.
- The cost of maintaining the existing data network will soon begin to erode operators’ profit margins and will eventually outstrip revenue.
- Operators will need LTE, which is optimised to carry data at a greatly reduced cost compared to legacy networks.
- LTE’s twin benefits of improved spectral efficiency and a flat RAN architecture reduce network carriage costs and create a cost–growth curve that tends to track revenue rather than demand, allowing an operator to maintain a healthy profit margin.
- But building an LTE network is a major investment, and network sharing may be the only way that some operators can afford to invest in LTE. LTE network sharing may be a viable alternative to M&A.
- Deploying a new LTE network offers operators the chance to plan a shared access network without wrangling over the value of existing assets – one of the main reasons why non-greenfield network-sharing agreements founder.

Source: Analysys Mason
Net4Mobility in Sweden is the first LTE RAN sharing venture

- Swedish operators Tele2 and Telenor announced in April 2009 the creation of Net4Mobility, their LTE and GSM joint network venture
- The shared LTE network will provide 99% population coverage by 2013
  - the network will support peak download rates of up to 150Mbit/s in urban areas and up to 80Mbit/s elsewhere
  - the operators’ spectrum holdings in the 900MHz and 2.6GHz bands will be pooled, which is especially beneficial for LTE, which operates most effectively in wide bandwidths.
  - the combination of low- and high-frequency spectrum will enable the operators to provide good-quality outdoor and indoor coverage as well as the capacity needed for traffic hotspots
- In addition to the shared LTE network, the partners will build joint GSM and transmission networks
- Cost savings are the main driver for the network-sharing venture
- The two operators can build on the experience of their 3G RAN-sharing arrangements with other partners
  - Tele2 with TeliaSonera (Svenska UMTS-nät)
  - Telenor with 3 (3GIS Sweden)
- We expect other LTE network-sharing ventures to emerge as new spectrum in the digital-dividend and 2.6GHz bands becomes available in European and other markets over the next three years or so
A complex variety of network-sharing configurations is emerging …

<table>
<thead>
<tr>
<th>Scope of sharing</th>
<th>Organisational structure</th>
<th>Network replanning</th>
<th>Geographical extent</th>
<th>Operational teams</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Tower/site sharing</td>
<td>• National roaming agreement</td>
<td>• Complementary build</td>
<td>• Urban only</td>
<td>• Maintain operational teams</td>
</tr>
<tr>
<td>• ‘Deep passive’ site sharing</td>
<td>• Passive sharing agreement</td>
<td>• Matched pair</td>
<td>• Rural only</td>
<td>• Combine operational teams</td>
</tr>
<tr>
<td>• Active 3G RAN sharing</td>
<td>• Active sharing agreement</td>
<td>• Full replanning of networks</td>
<td>• Whole network</td>
<td>• Outsource</td>
</tr>
<tr>
<td>• Active LTE RAN sharing</td>
<td>• Joint venture (could include sale or lease-back)</td>
<td>• Consolidate on a single network</td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Active 2G RAN sharing</td>
<td></td>
<td>• Regional consolidation</td>
<td></td>
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<tr>
<td>• Backhaul sharing</td>
<td></td>
<td>• Joint development of new sites</td>
<td></td>
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<tr>
<td>• Core sharing</td>
<td></td>
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<td></td>
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<tr>
<td>• National roaming</td>
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</table>
… which leads to many different combinations of strategic choices

<table>
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<tr>
<th>Scope of sharing</th>
<th>Org. structure</th>
<th>Network replanning</th>
<th>Geographical extent</th>
<th>Operational teams</th>
<th>Example deal</th>
<th>Implement -ation cost</th>
<th>Savings</th>
<th>Timescales</th>
<th>Risk</th>
<th>Control</th>
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</thead>
<tbody>
<tr>
<td>2G site share/active 3G RAN share</td>
<td>Joint venture</td>
<td>Full replanning of networks</td>
<td>Whole network</td>
<td>Hybrid of combined and outsource</td>
<td>Orange/ Vodafone - UK (original)</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Active 3G RAN share</td>
<td>Joint venture</td>
<td>Joint development of new sites</td>
<td>Rural only</td>
<td>Maintain operational teams</td>
<td>3GIS - Sweden</td>
<td>Low</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
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<tr>
<td>Active 3G RAN share</td>
<td>Joint venture</td>
<td>Full replanning of networks</td>
<td>Whole network</td>
<td>Outsource</td>
<td>MBNL</td>
<td>Medium</td>
<td>High</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
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<tr>
<td>'Deep passive' site sharing</td>
<td>Passive sharing agreement</td>
<td>Matched pair</td>
<td>Rural only</td>
<td>Maintain operational teams</td>
<td>N/A</td>
<td>Low</td>
<td>Medium</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
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<tr>
<td>Tower/site share</td>
<td>Passive sharing agreement</td>
<td>Full replanning of networks</td>
<td>Whole network</td>
<td>Combine operational teams</td>
<td>N/A</td>
<td>Medium</td>
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<tr>
<td>Active 3G RAN share/active 2G RAN share</td>
<td>Joint venture</td>
<td>Consolidate on a single network</td>
<td>Whole network</td>
<td>Outsource</td>
<td>N/A</td>
<td>Medium</td>
<td>High</td>
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<td>High</td>
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<tr>
<td>Active LTE RAN share/active 2G RAN share</td>
<td>Joint venture</td>
<td>Joint network development/ 2G network replanning</td>
<td>Whole network</td>
<td>Maintain operational teams</td>
<td>Net4Mobility (Tele2/Telenor) - Sweden</td>
<td>High</td>
<td>High</td>
<td>Medium</td>
<td>High</td>
<td>Medium</td>
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Typically the greater the sharing, the greater the savings

<table>
<thead>
<tr>
<th>Increased network ownership</th>
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<tbody>
<tr>
<td>Shared sites</td>
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<tr>
<td>Joint planning</td>
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<tr>
<td>Network sharing</td>
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<tr>
<td>Shared spectrum</td>
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<tr>
<td>Separate sites</td>
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<td>Separate planning</td>
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<td>Separate BS</td>
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<table>
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<tr>
<th>Increased cost savings</th>
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<tbody>
<tr>
<td>Spectrum Share</td>
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<tr>
<td>Network Share</td>
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<tr>
<td>Site share + joint roll-out</td>
</tr>
<tr>
<td>Site share</td>
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<tr>
<td>As is</td>
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</table>
Network sharing has many risks, which must be managed to achieve success

<table>
<thead>
<tr>
<th>Project risks</th>
<th>Third-party risks</th>
<th>Implementation risks</th>
<th>External risks</th>
<th>Confidentiality risks</th>
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<tbody>
<tr>
<td>Misalignment of objectives</td>
<td>Operator bias</td>
<td>Supplier risk</td>
<td>Regulatory</td>
<td>Disclosure</td>
</tr>
<tr>
<td>Complexity</td>
<td>Third-party bias</td>
<td>Service continuity</td>
<td>Commercial</td>
<td>Leaks</td>
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<tr>
<td>Data availability</td>
<td>Non-visibility</td>
<td>Timing</td>
<td>Market</td>
<td></td>
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<tr>
<td>Communication</td>
<td>Predetermined outcome</td>
<td>Technology</td>
<td>Technological</td>
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<tr>
<td>Way to process</td>
<td>Expertise</td>
<td>Consolidation</td>
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<tr>
<td>Fatigue</td>
<td></td>
<td>Site Leases</td>
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<tr>
<td>Politics</td>
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<td>Legal</td>
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<td>Staff</td>
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Mitigation

- Detailed planning and objectives setting
- Executive ‘buy-in’
- Using independent third parties to manage the process who are not aligned with any themes
- Using experienced personnel dedicated to specific tasks as a result of preplanning
- Using experienced third parties to manage the process
- Experience in similar process
- Regulatory experts
- Commercial strategy experts
- Disclosure
- Leaks
A JV team, representing all major MNO functions, must be established with an independent third party planning and managing the interfaces and processes to determine the optimum sharing model.

**Phase 1: Project set-up**
- Project kick-off
- Set up working procedures
- Detailed project scoping
- Review of available data

**Phase 2: Feasibility**
- Technical due diligence
- Geographical and financial modelling
- Matched pair approach
- Facilitation of go/no-go decision

**Phase 3: Detailed study**
- Radio planning and optimisation
- Re-plan approach
- Business planning and recommendation

**Benefit**
- Align expectations and prepare an intensive work programme
- Estimate benefits and short list key scenarios
- Measure real-life financial benefits and enable go/no-go decision

**Decide on best option**
Contents

Introduction to Analysys Mason
Gloal trends in network sharing
Case studies and track record
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Case Study 1: Shared RAN operations business case development and implementation

Scope/business challenge

- Two MNOs in a major Western European market engaged Analysys Mason to develop the business case for RAN operations sharing
- Minimising the cost of the venture was a major project consideration

Approach

- Developed different operational scenarios to be considered. Namely, unified operations, unified operations with national roaming and unified operations with RAN share
- Considered different rollout strategies – 3G sharing only, 2G and 3G sharing, national or rural implementation
- Developed business models to enable the most appropriate strategy to be identified
- After successful evaluation, gave assistance to the two operators in creating a new entity, and managed the restructuring and operation of the combined network including organisation design, financial budgeting and due diligence

Benefits and results

- Analysys Mason’s market and business processes understanding enabled the business case to be proven within a strict regime of mutual confidentiality protection so that competition law was not compromised
- Analysys Mason was able to provide detailed business, operational and network modelling to provide confidence to the Board’s of both stakeholders
- Our understanding of the deployment environment allowed significant opex and economies of scale cost reductions to be identified

Source: Analysys Mason
Case Study 2: Advice to Indian MNO considering options to spin-off a tower company/RAN share business

Scope/business challenge

• Our client in India (confidential) needed an independent consultant to help them assess the costs, risks and benefits of developing a TowerCo business

• This needed to consider business models for passive sharing (site sharing), various levels of active sharing (RAN sharing, backhaul sharing, etc.) and all other additional services that a MNO could wish to outsource to a partner

Approach

• We reviewed the mobile market in India to determine what demand there would be for TowerCo and RAN share services. This included using case studies from more developed markets to determine how the “Site” market could evolve and how MNOs’ needs and priorities could change

• Competition from other MNOs and the existing TowerCos was assessed

• We assessed the client’s site assets and potential for site sharing and RAN sharing

• Successful TowerCo benchmarks were used to determine processes and organisational structures to market and sell TowerCo services, including commercial recommendations

• A high-level business review of the various options were presented

Benefits and results

• Analysys Mason experience enabled the client to gain a full picture of the world TowerCo and RAN share market including trends over recent years, the values of transactions for acquisitions and mergers, and the lessons learnt and key success factors

• Vendor RAN sharing products were assessed, some proven, some in development. The options available would ultimately dictate which options would be available over a five-year timeline

• Our client was presented high-level options, together with benefits, risks, costs and revenues
Case Study 3: Reviewing the opportunity to share fixed network infrastructure to drive growth in ‘next gen’ networks

Scope/business challenge

- The UK communications regulator (Ofcom) is considering how competition might be maintained in a next-generation access network environment, and the potential role of duct access. Analysys Mason was appointed by Ofcom to carry out the biggest investigation in Europe into the availability of infrastructure availability.
- The report produced by Analysys Mason has been made publicly available on the Ofcom website.

Approach

- We agreed a sample network for investigation covering 11 cities and towns, which covered 31 routes including 817 chambers, 18,206 duct ends and 76 street cabinets over a total route distance of 143km.
- A programme of works was agreed with BT Openreach, which is responsible for the management of the network infrastructure in the UK.
- Analysys Mason and its subcontractor partners utilised innovative techniques to investigate the availability of space whilst ensuring there was no negative impact on operations or requirement for civil works.
- We further recommended that engineering processes and guidelines be developed and implemented to ensure BT Openreach could meet the requirements of new market entrants with an independent governance and programme management team.
- Other European countries such as France and Portugal are now undertaking similar processes and reviews.

Benefits and results

- Analysys Mason identified that 51% of duct ends have at least 42% unoccupied space, which in theory could drive down the costs of deploying new fibre and increasing competition. The availability of space is not evenly distributed, and network plans need to be updated to reflect changes and continuously maintained.
- We further recommended that engineering processes and guidelines be developed and implemented to ensure BT Openreach could meet the requirements of new market entrants with an independent governance and programme management team.
- Other European countries such as France and Portugal are now undertaking similar processes and reviews.

<table>
<thead>
<tr>
<th>Duct Nest 1</th>
<th>Duct Nest 2</th>
<th>Duct Nest 3</th>
<th>Duct Nest 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>90 mm duct</td>
<td>25 mm tube</td>
<td>Existing cable</td>
<td></td>
</tr>
</tbody>
</table>

Overview of cable duct occupancy
Case Study 4: Strategic advice on a groundbreaking UK RAN network share venture

Scope/business challenge

• Two MNOs in a major Western European market engaged Analysys Mason to assist in developing and dimensioning an active operational RAN Share programme
• Responsible for the consolidation of 18 000 pooled sites to 13 000 retained sites in a combined 3G (HxDPA) access network whilst safeguarding an existing 2G service
• The selection and management of an outsource partner to deliver the consolidation work and ongoing management of the network and transition of relevant staff to the selected supplier

Approach

• Developed and defined the Scope of Works and capability matrices for the consolidated network and outsource partner services
• Key involvement and responsibility in the evaluation, selection, contract negotiations and management of a strategic outsource partner to deliver the complex consolidation work and ongoing management of the network
• Responsible for Network Consolidation Planning and strategy to align all activities to the business case and targets to the parent companies
• We provided Commercial and Deployment Programme Management expertise, as well as providing ad-hoc expert consultancy support, to Board and Director level
• Transition Management of all key Deployment and Operational activities and personnel to the outsource provider by reducing the impact on the programme

Benefits and results

• Analysys Mason’s in-depth market and business processes understanding enabled the client to achieve their strategic outsource goals and consolidation targets to meet the overall business case with the minimum of disruption
• Our understanding of the commercial and deployment environment allowed the client to make savings and to get the challenging and complex programme back on track
Case Study 5: Network-sharing feasibility study and business model

Scope/business challenge

- Two major African MNOs engaged Analysys Mason to carry out a detailed feasibility study and develop a business model for network sharing in a key African market

Approach

Project was divided into three phases:

Phase 1 – Project set up

- Project governance was established, with the formation of three teams (one for each client and one Analysys Mason), led by Project Managers reporting into a Steering Committee

Phase 2 – Due diligence and benefits modeling

- A broad range of RAN- and network-sharing options were considered initially and were then filtered down to a number of preferred options
- Technical due diligence was carried out to fully understand the property, RF, transmission and site characteristics
- Full opex and capex study was undertaken and a ten-year “baseline” plan was developed for each client. Each of the preferred options was compared to the baseline in terms of commercial benefits

Phase 3 – Pilot area detailed study

- Results from a detailed technical study in one region using radio planning and automatic cell planning tools were used to refine cost and consolidation assumptions. The results were fed into the National model and the business benefits were presented

Benefits and results

- Both clients were able to assess the relative commercial benefits and implementation issues for a range of network-sharing options
Case Study 6: Support for an active network sharing initiative and business model in North Africa

Scope/business challenge

- Two major African MNOs, belonging to global companies, engaged Analysys Mason to carry out a detailed feasibility study and develop a business model for network sharing.
- Analysys Mason supported the MNOs to evaluate an initiative to assess the possible benefits to both parties of sharing parts of their respective 3G network infrastructure through a multi-operator radio access network (MORAN) arrangement.

Approach

- A number of different active RAN sharing scenarios that were available to both parties were explored and, in the context of the respective objectives, the most beneficial and practical scenarios identified. These were filtered down to a number of preferred options.
- Technical due diligence was carried out to fully understand both parties capabilities and to build a detailed view of common network costs.
- Provided practical considerations that the MNOs needed to be aware of, based on our experience of current active 3G RAN sharing programmes.
- A geographical analysis was provided to estimate the network coverage and split, as well as to estimate the number of sites that could be removed from each network.
- High-level financial benefits were evaluated and practical implications of a short range of scenarios, including active 3G RAN sharing, incorporating both technical and commercial considerations.
- A full opex and capex study was undertaken and a ten-year “baseline” plan was developed for each client. Each of the preferred options was compared to the baseline in terms of commercial benefits.

Benefits and results

- Provided both clients with independent, vendor-agnostic advice and a recommendation regarding the most appropriate active RAN sharing scenario(s) that the MNOs could implement, with clear rationales for each.
- Acted as an intermediary for sensitive information that the two MNOs were unable to share.
- Provided real-life experience based on a major active RAN share project.
## Selected other network-sharing projects Analysys Mason has undertaken

<table>
<thead>
<tr>
<th>Client</th>
<th>Project title</th>
<th>Overview</th>
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</table>
| European MSO                  | RAN sharing business model             | • We developed a business model for RAN sharing in rural areas for an MSO, starting with a visioning workshop that framed the remainder of the project  
• Extensive postcode analysis was carried out to establish the population and areas not currently covered by each operator's 3G network  
• The resulting data was then brought into the business model and we modelled the necessary investment required to extend the coverage under the scenario considered  
• From the required investment, the business cases were established  |
| European TowerCo              | Strategic review                       | • Our objective was to consider the impact that network sharing and RAN sharing would have on the tower business and also to include new technologies such as WiMax and LTE  
• Phase 1 was to present different scenarios to the Board and select three scenarios for financial modelling  
• Phase 2 culminated in the presentation of the three models together with recommendations on how to optimise their business  |
| Mobile operators in a Western European country | Mobile asset evaluation | • For two mobile operators in a Western European country, we assessed the current cost valuation of both individual networks on a standalone basis and on a combined basis, to support balancing payments that would be made at completion of a RAN-share transaction  
• Our analytical approach was based on detailed analyses of the fixed-asset registers of both operators, and also purchase ledger information and recent quotations from equipment manufacturers and other suppliers  |
| UK mobile operators           | Site-share project management          | • Analysys Mason’s programme team have managed key projects pushing delivery of site share sites on MNO towers and TowerCo towers. We have delivered this services to:  
  - Airwave (Emergency Services Communications)  
  - Vodafone (3G roll-out)  
  - O2 (2G and 3G)  
• Our thorough understanding of the site share allowed us to proactively manage what is recognised as a challenging process  |
## Contents

- Introduction to Analysys Mason
- Global trends in network sharing
- Case studies and track record
- Summary
The sharing of network infrastructure is a complex undertaking. Clear planning and assessment of options is required to ensure success

- Sharing two mature 2G and 3G networks is highly complex and requires immense cross-functional co-operation from partner companies to facilitate smart decision making
- Passive (site sharing) requires more equipment on site and therefore more detailed lease and tower assessments are required than for active (RAN) sharing, which is more or less a like-for-like swap
- In order to succeed, each partner needs to commits its best functional leaders in a neutral venue, with expert, independent and experienced consultants to support them
- Valuation tends to be a major obstacle in practice, but there are many other opportunities to save money without forming a JV
- For penetration into rural areas, especially in countries where rural site capex and opex is high, network sharing is needed to make the business case work
- Each network sharing team in each country is unique in some way so rigorous data gathering is vital to facilitate smart decision making
- LTE’s improved network economics are vital for mobile broadband, but operators may need to share the roll-out and running costs
- Increased backhaul demand and increased demand for high-rate data services, but harsh economic drivers will see fixed network infrastructure sharing increasing as well
- Fixed duct sharing is now established in France and Portugal, and work is in progress in the UK, demonstrating that network infrastructure sharing has started in the fixed world